AI and Rubrics-driven Assessments in Research-based Courses for SDG#4 and 9

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Abstract

The purpose of this paper is to review the ways of developing sustainable self-learning mindset via rubric-based skills development to become a self-learner with self-assessed rubrics on AI adoption for research-based courses in higher education. This paper draws conclusions from a qualitative nvivo analysis of selected nine papers on AI and rubrics-driven assessment on qualification framework (QF) level 5 in last five years. Based on the qualitative analysis on text search, the key elements in rubrics design of research-based courses in higher education (HE) at QF level 5 for sustainable development are: Rubrics on AI Tools for Skills Development', 'Ethical Thinking Development on AI' (1,343 references), 'Assessment on AI Argumentative Thinking' (651 references), 'Evaluation on AI Creativity in Tasks' (550 references), 'Critical Thinking on AI in Social Inclusion' (491 references) while 'Declaration on AI Tools' is found with 267 references compared with the top four elements. The findings are of managerial relevant to sustainable self-learning mindset, responsible management education curriculum design. It is recommended to validate the model proposed with on-going quantitative and qualitative data for a holistic view of rubrics on AI for competency building in research thinking and self-learning. It is time for academics, industry practitioners, NGOs and policy makers to consider these findings when exploring the ways of establishing a self-learning mindset via rubric-based skills development.

Keywords: *Self-learning, Qualification Framework (QF), Sustainable Development Goals (SDGs), Argumentative Thinking.*

Introduction

Facilitating organizational change via innovations for sustainable development continues to be one of the major challenges in corporations of different nature. The phrases of sustainability and corporate social responsibility (CSR) have been used interchangeably in the past few years. Organizations of different nature are seeking ways to enhance business growth, for example, designing innovative products and services, re-visiting the operations flow management system, and re-examining the outsourced business partners for quality. Based on United Nations (UN), the Rio+20 outcome document, *The Future We Want,* it mentioned that People are the centre of sustainable development; and Rio+20 promised to strive for a world that is just, equitable and inclusive, and committed to work together to promote sustained and inclusive economic growth, social development and environmental protection to benefit all. However, it is found the ways of reaching UN Sustainable Development Goals (SDG) were not covered comprehensively in the past years, for example, Goal 4 'Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all'; Goal 8 'Promote sustained, inclusive and sustainable growth, full and productive employment'; and Goal 17 'Strengthen the means of implementation and revitalize the global partnership for sustainable development'. In 2009, Wirtenberg uncovered seven qualities for building a sustainable enterprise, they were: top management support, centrality to business strategy, values, metrics, stakeholder engagement, systems alignment and organizational integration. From the findings of Wirtenberg, it was found that system alignment and organizational integration were the weakest dimensions of most enterprises. Hence, it is worthwhile to explore how to integrate people development into organizational systems with an innovative sustainable development mindset for achieving SDGs of UN.

According to Kerul et al. (2016), a Sustainability Mindset is intended to help individuals analyze complex management challenges and generate truly innovative solutions. The Sustainability Mindset breaks away from traditional management disciplinary silos by integrating management ethics, entrepreneurship, environmental studies, systems thinking, self-awareness and spirituality within the dimensional contexts of being (values), thinking (knowledge) and doing (competency). Kerul et al. (2016) highlighted that multi-

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disciplinary knowledge for developing a sustainability mindset was crucial. Besides, Kerul et al. (2016) provided a framework of "Sustainability Mindset" with the elements of:

1) How individuals' view the world and their role/place in it;

2) How individuals' view linking up with their assumptions, beliefs, and values; and

3) How individuals incorporate sustainability mindset systematically to understand the ecosystem of a society.

The definition of Sustainability Mindset put forward by Kerul et al. (2016) involves with content areas, dimensions, and components. This paper is to build on the framework of Kerul et al's Sustainability Mindset Model with four dimensions: Ecological Worldview, Systems Perspective, Emotional Intelligence and Spiritual Intelligence, applying the four dimensions into seamless and innovative assessments for helping learners to build a sustainability mindset with knowledge of the society where they live, with values (being) that they believe with interconnectedness, and competency (doing) in identifying feasible and innovative solutions for new problems.

This paper begins with literature and trends in higher education, responsible management education, corporate social responsibility (CSR) and innovations for sustainability The ultimate aim of this paper is to align with 2024 Policy Address of the Hong Kong Government in addressing the responsible use of AI. "The Financial Secretary, Mr Paul Chan, said, "As an international financial centre, Hong Kong's financial market is open and prudent towards the application of AI. The policy statement clearly sets out the Government's policy stance and approach towards the responsible application of AI in the financial market." (2024, Oct. 28th source:

https://www.info.gov.hk/gia/general/202410/28/P2024102800154.htm. The main research questions of this paper is on two areas:1) What are the key elements in rubrics design of research-based courses in higher education (HE) at QF level 5 for sustainable development? 2) What are the key elements to be added onto research-based courses at QF level 5 to meet the needs of the future?

Introduction

In line with the UN Decade 2005-2014 on sustainability, many research papers have been found on the sustainable development (SD) in the higher education sector. Different institutions have their own interpretations of sustainable development. In general, sustainable development is related to economic, social and environmental impacts with responsible decision making of allocating resources to meet the present and future needs of a society. This links up to the way of management in defining and interpreting sustainability when setting and implementing their short and long term strategic goals with total involvement of academic and administrative staff. Buying in the concept of sustainable development is the first and the most significant step in implementing sustainability related actions in an institution as the perception of staff on SD well relates to their understanding and exposure on sustainability.

According to the definition of Brundtland Commission (1992) of the United Nations, "sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." The basic element of sustainability is the economic aspect to support the business in short term, and support the new products, services, processes and people in the long term. In global initiatives of the "United Nations (UN) Decade of Education for Sustainable Development" (DESD) 2005-2015, the mission of DESD outlined by United Nations United Nations Educational, Scientific, Cultural Organization (UNESCO) is to meet the needs of the present without compromising those of future generations. Education is to learn how to learn, un-learn and re-learn through on-going helping people develop values, skills, attitudes, and knowledge with the principles, values and practices of sustainable development; and this kind of proactive thinking has to be integrated into all aspects of education and training to people in all nations at different ages to develop economic, social, environmental and cultural awareness and to seek solutions for these problems. Hence, ESD is relevant to all nations and

all higher institutions. Management in higher educational institutions need to keep on practicing the rationale of ESD beyond 2015 through integrating ESD in their institutional operational level in setting strategic goals and performance indicators; and school / programme level in re-visiting the curriculum for the benefit of learners and the community.

As mentioned by UNDESD, quantitative and qualitative ESD indicators are needed to be incorporated into different aspects of education for regular monitoring and reviewing purposes. This paper is going to adopt the six principles of UNPRME and 17 UN SDGs with the CSR guidelines of ISO 26000 to present a project of video production for capacity building in terms of building learners' creativity, team spirit, communication and enhancing teachers' innovations in assessing learner's competency to become a future leader with sustainable development mindset.

From Sustainable Development (SD) to Sustainable Development/ Sustainability Mindset

In recent years, the higher educational sector has started to address the issues of sustainable development in their operations and curriculum design. This has created a dramatic need of educators, especially curriculum designers, with a mindset of sustainability and social responsibility (SR); and the skills of writing sustainability related reports to communicate with stakeholders for accountability and transparency. This triggers the author to study the elements of sustainable development and sustainability mindset to align with the UN PRME principles and UN SDGs for developing learners to become a future leader with SD mindset for economic, social and environmental impacts.

The purpose of this paper is to explore the application of the Sustainability Mindset Model of Kerul e tal. (2016) with the six principles of UN PRME, the 17 UN SDGs with the seven dimensions of ISO 26000 Corporate Social Responsibility (CSR) Guidelines to identify the steps of designing relevant sustainability-related activities to assess learners with knowledge (thinking), values (being) and competency (doing) in the four dimensions of ecological worldview, systems perspective, emotional and spiritual intelligence to fill the gaps between academics and industries in terms of developing talents with relevant knowledge, skills, attitudes and values for the future.

According to the information released in HK government website, the concept of sustainable development is adopted from the World Commission on Environment and Development that "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." ["Our Common Future", 1987] Based on information from HK government website, it seems the focus is more on UN SDG 11 Sustainable Cities, SDG3 Good Health and Well Being, SDG 6 Clean Water, SDG7 Clean Energy and 13 Climate Action that "building Hong Kong into a world-class city and making Hong Kong a clean, comfortable and pleasant home would require a fundamental change of mindset" to achieve the following three main areas:

- Finding ways to increase prosperity and improve the quality of life while reducing overall pollution and waste;

- Meeting our own needs and aspirations without doing damage to the prospects of future generations; and

- Reducing the environmental burden we put on our neighbours and helping to preserve common resources. ("1999 Policy Address")

However, more efforts are needed in higher education sector to engage learners, design curriculum, deliver materials, assess learners and help students/ teachers/ administrative staff to build a SD mindset to achieve the above three main areas.

Sustainable Development and Knowledge-based Economy

The concepts of sustainable development have been most debated subjects and of great importance in the future, especially in higher education sector where leaners are educated to prepare how to face the challenges for the future and how to develop themselves personally and professionally in a sustainable manner. Szitar (2014) mentioned that community development was related to sustainability which needed to have stakeholder collaboration, linking up changes with sustainability, adopting interdisciplinary and multidisciplinary approach in teaching in architectural education, for example case study and PAPSA (Presentation, Analysis, Production, Selection and Application) methods and providing solutions in a holistic manner. Pinho et al. (2015) also university not only enabled professional growth, but also in the personal level (p. 162). Besides, they highlighted that contextualization in crucial in university education, including creating a variety of contexts for leaners learning how to perceive the world, how to handle adverse situation, how to develop belonging to the syllabus, how to experience practical contents, and how to create professional network via opportunities in extracurricular activities that are complementary to their studies.

In fact, Gedzune (2013), Gedzune and Gedzune (2012) and Pohl et al. (2010) also mentioned that teacher training and engagement with reflection, action research and co-production of sustainability-related research were needed to understand the importance of a broader and inter-relating perspective on issues related to sustainable development for the future. Back to 2005, Kitagawa pointed out that the role of universities in the knowledge society was examined in light of the emergence of new research and learning systems, conditioned by forces of both globalisation and regionalization with impacts of these new relationships perceived in four principal dimensions: economy, human resources, governance and community. Based on UN SDG 4 Quality Education, it is expected to increase the supply of qualified teachers, including through international cooperation for teacher training in developing countries. Hence, the objectives of this chapter is not only to facilitate our young people to use technology to convey stories of inner values and UNSDGs and UNPRME; to share the good practices of video produced for inner values, for example, responsibility and harmony in different industries working towards UN sustainable development goals; but also identify the potential use of the completed video / movie in seamless teaching and learning and in building a platform of knowledge exchange for developed and developing countries.

As we know, the economic development of most countries is now turning from manufacturing into service production which calls for talents with professional knowledge, skills, attitude and values. Kivunja (2015) brought up that the economies had been increasingly globalised with digital technologies assuming ubiquitous presence and functional utility in peoples' lives outside educational contexts. He mentioned that educationalists needed to prepare learners for the Digital Economy, requiring the teaching of new skills rather than the traditional core subjects. Kivunja (2015) named this realization as a New Learning Paradigm, teaching students with skills most demanded in the 21st century. He put forwarded the 4Cs super skills, that is, critical thinking skill, communication skill, collaboration skill and creative skill. If learners are taught with these four super skills with sustainability contents and community development mentioned by Szitar (2014) and contexts for development mentioned by Pinho te al. (2015), it is assumed that the community will be a better one under knowledge-based economy within a digital technology environment.

Sustainable Development and Corporate Social Responsibility (CSR) in Higher Education

Under keen competition for resources and unexpected risks from natural and human-made disasters, people are aware of the importance of sustainability in education. In fact, the concept of sustainability can be traced back to the thirteenth century but in more recent times it appeared in the environmental literature in the 1870s (Kamara et al., 2006 quoted in Jones et al., 2011). Jones et al (2011) suggested that sustainability was about human survival and the avoidance of ecological disaster' with complex and technical meaning from a professional perspective. They argued that sustainability could be seen as the goal or endpoint of a process called sustainable development. They also mentioned that a number of attempts had been made from scholars in interpreting sustainability that theoretical frameworks of connecting the nature and society were needed to recognize social and economic development could not be viewed in isolation from the natural environment. (Amsler, 2009, p.123 quoted in Jones et al. p.258)

In 2011, Djordevic and Cotton realized that there had been a growing awareness in national and international policies to integrate sustainability into both business and educational arenas. They emphasized that education for sustainability development (ESD) was an issue of increasing importance in higher education, including the campus, curriculum, community and culture of institutions. They quoted the ideas of UNESCO that ESD was "a process of learning how to make decisions that consider the long-term future of the economy, ecology and equity of all communities". From an institutional perspective, policy and strategy related to sustainable development in higher educational institutions have to be driven from the management, for example, curriculum design and development policy, teaching and learning policy, research policy, campus design and maintenance policy. Two years later, Ryan and Tilbury (2013, p.272) mentioned that though the need to embed Education for Sustainable Development (ESD) in the higher education curriculum was well recognized in international sustainable development dialogues, substantial obstacles were encountered which called for systemic education change. They uncovered that educators needed to re-think the purpose of education with a new angle of visiting existing pedagogy practices to extend learning opportunities for learners who could contribute more for the future. They concluded a deeper reflection on teaching and learning was needed to make ESD a viable education proposition for transferring skills. They also put forward that engaging learners with experiences on sustainable development was significant as this would lead learners to further develop their critical thinking, provocative questioning skills and devising new ways of living.

Besides, Yeung (2014) also highlighted that responsible corporations needed to adopt the seven dimensions of Corporate Social Responsibility (CSR) guidelines of ISO 26000 in their operations: labor practices, consumer issues, fair operating practices, human rights, organizational governance, community involvement and development and the environment.She mentioned that the priority of the seven dimensions was subject to the strategic planning of the management and the expectations of their stakeholders. According to Cajazeira (2008 quoted in Yeung, 2014), the major principles for ISO 26000 are: accountability, transparency, ethical behavior, consideration for the stakeholders, legality, international standards, and human rights. It is the responsibility of organizations to consider the needs of the stakeholders in these seven aspects when designing work processes or executing business-related activities. In fact, ISO 26000 CSR guidelines convey a message that non-economic inputs and soft side of outcomes are the trend of quality management system (QMS).

In order to fulfill the needs of UNESCO and the gaps uncovered by scholars, this paper focuses on exploring ways to link institutional vision and strategic goals with social reporting principles and ISO 26000 CSR guidelines to define steps of engaging stakeholders, identifying possible risks and setting sustainability / CSR related goals for making the institution becoming a more sustainable one. Yeung (2014) mentioned that building quality into products and services were not suffice for continual improvement. She called for new ways of integrating sustainability and CSR into organizational strategy for sustainable business. In fact, Mootee (2013, p. 59) brought up a similar viewpoint of Yeung (2014) that "More than 80 percent of our management tools, systems, and techniques are for value-capture efforts, not for value creation; this includes techniques such as total quality management (TQM), enterprise resource planning (ERP), Six Sigma, Lean Startup, and Agile Systems. These tools are valuable for keeping an enterprise running smoothly. But we should be focusing on value creation rather than value capture alone. This is where design thinking comes into play. Companies such as Apple, Amazon.com, Netflix, Samsung, Burberry, and BMW are winning by design and the thinking behind that design." He mentioned that solving problems needed to have a multi-functional and multi-perspective approach that influenced many of the principles inherent in design thinking, that is, core values, identities, expectations, and views of the world. He emphasized that 'responsibility to shape the future' was critical and actions had to be humanized, meaningful and connective. When applying the concepts of design thinking in setting sustainability – related goals for educational institutions, it is recommended to embed the principles of empathy, an approach to collective problem solving, and a framework to balance needs and feasibility.

Design Thinking for Sustainable Institution

Problems that we come across may not be the same as those in the past. Hence, a new perspective for problem-solving is needed for sustainable development. Mootee (2013, p.39) put forward the idea of design

thinking, a natural and inherent thinking, which was an approach to inquiry and expression that complemented and enhanced existing skills, behaviors, and techniques. He mentioned that design thinking was a date-driven analytical thinking with its own mode of analysis – one that focused on forms, relationships, behavior, and real human interactions and emotions. He recommended that design thinking could be applied in the following ways of which they were relevant for sustainable development in higher education:

"1) How a product, service, system, or business currently lives in an ecosystem;

2) How people interact with the above and the nature, frequency, and attributes of that

 interaction;

3) How the different elements in the ecosystem relate to one another and if any systems-level impact exists;

4) What other ecosystems exist adjacent to your ecosystem;

5) How new insights may be gained by looking broadly at communicative events within these ecosystems and how they fit together from a

 systems perspective;

6) What the key characteristics and patterns of behavior of new relationships are when viewed from a system level; and

7) What the patterns of people's information behviors are and how to map them visually to make sense of them" (Mootee, 2013, p. 39)

From the above, design thinking can empower organizations and individuals to better understand their competitive and operational environment for perceiving and solving problems with realization of behavioral patterns, values attached to systems-level and processes of meeting challenges.

Apart from a system level, a process of level in programme / module design with sustainable development and social responsibility are also needed to be addressed. In the 17th International Conference on Teaching and Learning organized by UNESCO-APEID, Bajunid (2014) mentioned that any radical turning points in professional policy shifts required mid-set changes in teachers regarding their beliefs, assumptions, out the box thinking, time management, creativity, edupreneurship and wethanschaaung. "The emerging of basic literacies and new literacies demand continuous learning by teacher as perennial leaner." Bajunid (2014) also quoted the code of practice for quality assurance in public universities in Malaysia developed by the QA Department of the Malaysian Ministry of Higher Education (2008) that the key foci of programme quality were: conceptual framework, knowledge, skills, content knowledge, pedagogical content knowledge, pedagogical and professional knowledge and skills, professional disposition and assumption system with evaluation, field experience and clinical practice, diversity, faculty qualifications, performance and development, unit governance and resources (p.6) Moreover, he highlighted that all programmes objectives should align with the following learning outcomes:
1) Knowledge;

2) Practical Skills;

3) Social Skills and Responsibilities;

4) Communication, Leadership and Team Skills;

5) Problem-solving and Scientific Skills;

6) Information Management and Life-long Learning Skills; and

7) Management and Entrepreneurship Skills.

Yeung (2014) echoed the ideas of Bajunid (2014) that the following four characteristics were desirable for a social responsible teacher in the future teaching under the digital age. Teachers need to develop techniques to cater a diversified group of students through traditional and non-traditional classroom setting, for example, blending learning and virtual learning environment to motivate students as co-producers for meaningful and relevant curriculum. The eight characteristics are:

1) Knowledge and Intellectual Skills –

   Multi-disciplinary knowledge and multi-thinking with a mindset of change

2) Processes –

   Value creation and waste reduction via curriculum review and revision

3) Autonomy, Accountability and Application-

  Acceptance of professional responsibility with people respect and continual improvement

4) IT, Numeracy and Communication-

   Using technology and information with environmental concerns in teaching and curriculum design

In 2010, Fisher realised that corporate sustainability/ social responsibility was of utmost importance for the survival of organizations and their future generations of employees. "Organizations' product/ service offerings and vendor networks are interconnected globally and are being recognized on a global scale " (P. 29) If educators can visualise the sustainable development goals of UNESCO, crystallize the manpower projection into curriculum design, can realise the ways of implementing 4Cs into designing community development related programmes, the institution is working towards a sustainable organization for the benefit of learners, the industries, and the community as they can develop awareness of sustainability and social responsibility to their peers and influence students to learn in a sustainable way. Based on the literature of the above, the author has generated a model of sustainable

institution (see Figure 1.0).

Qualification Frameworks (QF) in Higher Education (HE)

In line with the UNESCO 1998 publication entitled: "World Declaration on Higher Education for the Twenty-First Century: Vision and Action ", it is believed that all education, including higher education, should serve the needs of economic and vocational development. The declaration of UNESCO highlighted that "new vision of higher education is needed to cater to more diversified categories of people, and of its contents, methods, practices and means of delivery, based on new types of links and partnerships with the community and with the broadest sectors of society." As a result, institutes need to have principles in devising their mission for fulfilling the declaration of UNESCO.

Another objective of education is to equip learners with skills and attitudes for the workplace. Hence, a new requirement on vocational competence has emerged. Bohlinger (2008) mentioned that the introduction of a qualifications framework (QF) is to make national educational systems more transparent, more innovative and more competitive. Besides, it can also help improve the match between the educational system and the labor market. Thus, "QFs are seen as engines of innovation: the point of introducing them is to promote a number of fundamental, long-term reforms." (Bohlinger, 2008, pp. 96) He further pointed out that unlike national QFs, it addresses priorities of the European Union and does not include binding mechanisms of recognition addressed to individuals.

Recently, Pless et al. (2012) promoted the use of integrated service learning with involvement of non-governmental organizations (NGOs) and social entrepreneurs to bring insights to learners. "Understanding how participants make sense of, and learn from, their experiences abroad provide us with insights into how service learning programs can help managers to develop the knowledge, skills, and mind-set that will enable them to successfully support a company's global sustainability and corporate social responsibility (CSR) efforts." (2012, p.1) Hence, a comprehensive qualification framework needs to embed the rationale of integrated experiential service learning when developing different kinds of skill sets for learners, aiming to broaden, deepen and expand their horizon with a focus on responsibility and sustainability in this dynamic world.

In Hong Kong, the Qualification Framework (QF) was born in 2008. Based on the information released from the Education Bureau (EDB), the aim of having QF is to help people in Hong Kong to set a goal for life-long learning with qualifications assured through the seven levels of qualifications covering academics, vocational and continuing education. The QF levels help visualize an articulation ladder for the learners. Levels 1- 3 cover programmes in certificate levels while levels 4-7 cover programmes from diploma, undergraduate degree to master degree and doctoral degree levels. In each level, there are two to six descriptors under each category to measure the learning outcomes of modules in a programme. These descriptors are classified into the following four categories as shown in the following table of level 5 – undergraduate level provided by The Hong Kong Council for Academic Accreditation and Vocational Qualifications (HKCAAVQ):

-Knowledge & Intellectual Skills;

-Processes;

-Application, Autonomy & Accountability; and

-Communication, IT and Numeracy.

Table 1 Generic Level Descriptors (GLD) - Level 5

Knowledge & Intellectual Skills	Processes	Application, Autonomy & Accountability; and	Communication, IT and Numeracy
- Generate ideas through the analysis of abstract information and concepts - Command wide ranging, specialised technical, creative and/or conceptual skills - Identify and analyse both routine and abstract professional problems and issues, and formulate evidence-based responses - Analyse, reformat and evaluate a wide range of information - Critically analyse, evaluate and/or synthesise ideas, concepts, information and issues - Draw on a range of sources in making judgements.	- Utilise diagnostic and creative skills in a range of technical, professional or management functions - Exercise appropriate judgment in planning, design, technical and/or supervisory functions related to products, services, operations or processes.	- Perform tasks involving planning, design, and technical skills, and involving some management functions - Accept responsibility and accountability within broad parameters for determining and achieving personal and/or group outcomes - Work under the mentoring of senior qualified practitioners - Deal with ethical issues, seeking guidance of others where appropriate.	- Use a range of routine skills and some advanced and specialized skills in support of established practices in a subject/discipline, for example: - Make formal and informal presentations on standard/mainstream topics in the subject/discipline to a range of audiences - Participate in group discussions about complex subjects; create opportunities for others to contribute - Use a range of IT applications to support and enhance work - Interpret, use and evaluate numerical and graphical data to achieve goals/targets.

The QF of programmes delivered by institutes is assessed by an independent party named HKCAAVQ through programme validation exercises. The HKCAAVQ was established in 1990 as an independent statutory body to provide authoritative advice to the Hong Kong Government on academic standards of programmes, including sub-degree, and secondary as well as vocational qualifications in the higher education institutions. The role of HKCAAVQ in the QF area is to assure the quality of the learning programmes. As an accreditation authority of QF, the HKCAAVQ assesses the programmes provided by institutes (programme providers) from the following perspectives:

1)Achieving stated educational objectives;

2)Operating learning programmes; and

3)Meeting the required standards to achieve stated learning outcomes with reference to the Generic Level Descriptors (GLD) of QF.

Quality Tools for Quality Indicators

Quality by itself is neutral (Conti, 2013). The value of quality is interpreted from the eyes of customers in terms of fulfilling requirements with unique characteristics of the products and/ or services delivered. Conti (2013) mentioned that the value judgment was always expressed by people and derived by the associated attributes to the word quality. He further pointed out that the scope of the quality management concept suffered from missing strategic content of which many of today's quality practitioners have tried to identify quality management with defect reduction (doing things right). There is an increasing emphasis on using statistics in reducing variations in processes for maintaining management system performance and for proving a fit-for-purpose system.

 The commonly used quality management concepts used in maintaining and improving processes are: Quality Management System (QMS) of ISO 9001, Corporate social Responsibility (CSR) of ISO 26000, Six Sigma of Quality Function Deployment (QFD) with graphical aid of House of Quality (HoQ) to consider the needs and desires of the customers. The latest initiative of United Nations (UN) is United Nations Sustainable Development Goals (UNSDGs) can be considered as a quality tool to develop a mindset of quality management and sustainable development through integrating UNSDGs into the design of processes and products/ services for building a social inclusion community.

Since the adoption of UNSDGs in New York in September, 2015, inclusive community (SDG#16) with quality of education (UNSDG#4) for economic development (SDG#8) has been mentioned. The application of United Nations Sustainable Development Goals (UNSDGs) into policy-making, product/ service design and staff development have become a trend. This paper is to explore the use of a selected theme of UNSDGs, for example, UNSDG 5 Gender Equality and 9 Innovations of blockchain together with ISO 9001, ISO 26000 and blockchain related papers to develop social inclusion quality indicators. These findings provide a better understanding of using social inclusion quality indicators for working towards UNSDGs via implementing blockchain content distribution technology in higher education sector.

 Challenges in Educational Institutes

For the critics of curriculum, Kelly and Ron (2014) mentioned that responsible management education curriculum must address three foundational challenges in business education if it is to actualize the aspirations of Principles for Responsible Management Education (PRME) of purpose, values, methods, research, partnerships and dialogue : 1) it must confront the cognitional myth that knowing is like looking, 2) it must move beyond mere analysis to systems thinking, and 3) it must transition from a value-neutral stance to a values-driven stance. (2014, p.631) Apparently, they supported to integrate United Nations PRME principles (purpose, values, research, methods, on-going dialogue and partnership), UN initiatives, for example, UNSDGs and sustainable related strategies, for example adoption of ISO 9001 and ISO 26000 into curriculum design of blockchain content distribution technology for using technology proactively in a human-based approach for social inclusion.

Though quality management system (QMS) requirements and CSR guidelines are commonly used in manufacturing and servicing industries, they are not being practiced strongly with the new initiative of UNSDGs in the higher education sector. Educators should increase the exposure of its teaching staff in relation to the new technology of blockchain content distribution technology and to the use of quality concepts in curriculum design for learners to meet the changing needs of the society on top of the Qualification Framework's (QF) generic descriptors used in the educational sector for learning outcomes. Hence, this paper is going to explore the commonalities between ISO, CSR, blockchain related papers and interview results for developing some generic social inclusion quality indicators for deriving a full picture of the performance of applying blockchain in the higher education sector. The research questions are:

-What are the key elements in rubrics design of research-based courses in higher education (HE) at QF level 5 for sustainable development?

-What are the key elements to be added onto research-based courses at QF level 5 to meet the needs of the future?

AI Rubrics Adoption and Research-Based Courses

Under green economy and contemporary issues in higher education, for example, ethical use of artificial intelligence (AI) and development of hgher order problem solvig skills for students to meet future challenges in study, career and life. The use of rubrics and assessment guidelines are frequently used to assess the competencies of students. With the emergence of AI in teaching and learning, a robust and multidimensional evaluation tools beside rubrics or. Artificial Intelligence (AI)-driven rubrics may be considered to facilitate self-assessed learning mode. When integrated with pedagogical theories such as Outcome-Based Education (OBE) and the five steps of Design Thinking, AI rubrics in a certain extent is feasible to enhance the evaluation of students' research competencies, critical thinking, originality, and problem-solving skills.

Rubrics are scoring guides that delineate performance criteria across various levels of achievement (Andrade, 2005). In 2012, Yeung mentioned that "correlation results show that students' higher level of learning shall be built on developing lower level of learning. The results are supported by the Rasch Model "Item/Person Misfit Order Table"." With the advancement of AI technology, the use of rubrics with automation may be a lesson to explore and learn, helping students to realise how to build foundation knowledge with process of learning in a more transparent way via refinement of rubrics with AI assistance. Baker et a. (2020) mentioned that real-time feedback to students to facilitate learning, personalized assessment to build self confidence, and insights in improving learning are important. In Hong Kong, a QF level 5 programme may be designed with a coursework of research elements. It is time to re-think and refine QF level Generic Descriptor with rubrics on AI elements to assess students' competencies so as to improve students' critical and argumentative thinking for objectivity. Research-based courses at QF level 5 aims to cultivate students' abilities to have leadership skills and problem solving skills in a not-quite-familiar situation for analyzing data, and identifing workable solutions. Hence, assessment tools are crucial to measure competencies of students in terms of research methodology, ethical mindset in data collecton, and innovative use of AI in predict expected solutions with critical analysis.

Outcome-Based Education (OBE) in Assessment

Outcome-Based Education (OBE) focuses on clearly defined learning outcomes and aligning teaching, assessment, and learning activities to achieve these outcomes (Spady, 1994). OBE emphasizes the learning outcomes demonstrated by learners and build competencies, instead of, rote learning. This is important for students at QF level 5 with research-based coursework, assessing students' ability to understand the real world issues, apply research methods, develop a ethical mindset in data collection, analyse primary and secondary data for insights in response to issues identified. If AI rubrics are integrated into OBE learning outcomes – programme intended learning outcomes (PILOs) and course intended learning outcomes

(CILOs), a more comprehensive competency-based assessment model may fit to assess students under a digital economy decade.

Besides technology, design thinking is also needed to balance AI rubrics and human-centered problem-solving skills for issues identified. The 5 steps of design thinking - empathy, scope, ideation, prototyping, and testing (Brown, 2009) are expected to immerse into ubrics to nurture students with social inclusion, creativity, collaborations for humanistic solutions. Evaluation within AI rubrics with design thinking framework emphasizes students' ability to understand the needs of the world with students' life experiences and story of learning, generate feasible and innovative ideas with the help of AI, and develop feasible prototypes for solutions. AI rubrics tailored made with 5 steps of design thinking at QF level 5 research-based course can assess students' competences from multiple dimensions, including empathy, defined scope, ideation quality, prototype functionality, and iteration effectiveness. These rubrics enable students to understand their learning processes and outcomes, fostering reflective practice (Liedtka, 2018). However, QF level 5 research-based course designers, assessors and students in higher education continue to evolve, and AI rubrics with design thinking frameworks may offer help to reflect the competencies of students of diversity with consideration of social inclusion.

Implementing AI rubrics in QF Level 5 research courses involves several key components:

1. Alignment with PILOs and CILOs of Programmes: Rubrics are designed to evaluate specific competencies mentioned in the course outlines, for example, research-based course on research methodology, data analysis, critical thinking, creativity, and ethical considerations.

2. Multi-dimensional Assessment for Whole Person Development: AI rubrics assess students' performance from different dimensions, e.g. the four dimensions of GLD – knowledge and intellectual skills, processes, application/ accountability/ autonomy, and communication/ IT/ numeracy

3. Instand Qualitative and Quantitative Feedback for Competency: immediate feedback with AI – assistant rubrics helps students identify strengths and weaknesses before end of the course, and promoting self-assessment aligned with PILOs, CILOs, and OBE principles.

4. Consistency and Objectivity of AI Rubrics among Teaching Fellows in Courses with Similar PILOs/ CILOs: AI rubrics applied into assessing students' competency in research-based courses help to avoid human bias.

5. Ai rubrics with Consolidated Data for Insights in Research-based Course Delivery and Assessment: AI rubrics incoporated into assessment guidelines provide teachers in research-based courses to identify the trends of student performance and make adjusments in the curriculum.

Methods – Content Analysis

Sharda et al. (2013) mentioned that analyzing data could be used to understand customers/ clients and business operations to sustain growth and profitability for enterprises. In fact, data can be found in various forms and fashions. Using timely data can help interpret current phenomena for decision making. They further pointed out the following ways for data mining for the benefits in business sustainability (Sharda et al. 2013, p. 155-156):

1) Association – finding commonly co-occurring grouping of things for market analysis;

2) Predictions – identifying the future occurrence of certain events based on what has happened in the past;

3) Cluster Information – seeking the nature of groups of things based on their known characteristics; and

4) Sequential Relationship - discovering time-ordered events

Data can be verbal and non-verbal messages. It represents the ideas of people. If data can be co-ordinated, integrated, or controlled in a meaningful way, the behavior of people or an organization can be understood, predicted and controlled. With the use of content analysis and related qualitative software, for example, NVivo, data can be analyzed and interpreted meaningfully and comprehensively. Content analysis can be regarded as a tool for understanding people's thinking and beliefs, to uncover the methods of persuading people to accept ideas, to differentiate practices among certain groups of people and to see the trend of certain practices. Textual messages are the data that content analysis works with and from which concepts for further analysis are derived.

Content analysis is a systematic and objective analysis of selected text characteristics. It involves counting the number of words and the frequency of different types of words; finding out the characteristics of themes, building relationships among items, paragraphs, and finally establishing meaningful concepts. It is not simply a quantitative research method but also a qualitative one since the purpose of the writing is also understood through doing the analysis. The advantages of content analysis are:

-No people are involved;

-No experiments are required; and

-Texts from the recent past can reflect social phenomena.

However, content analysis also has limitations. There may be issues relating to the availability of texts and the interpretations may be subjective. In order to guard against undue subjectivity, researchers should follow the advice of Babbie (2001):

-Trace the person or authority composing the documents;

-Think about the reasons behind the existence of the documents;

-Find out the ways of acquiring the information contained in the documents;

-Investigate the magnitude of biases in the documents;

-Identify the main concepts used by the writer; and

-Internalize the concepts that the documents have demonstrated.

Key Findings

In the present research, the key elements found in rubrics design of research-based courses in highre education at QF level 5 will be identified. When undertaking content analysis, the author has been aware of the sampling pattern and the levels of units, that is, the key dimensions of inputs, processes and outputs; and elements of rubrics and learning outcome related documents for analysis. The documents were taken from the internet on AI rubrics at Qualification Framework QF Level 5 related documents, Hong Kong to identify the key social inclusion quality indicators in blockchain content based distribution technology. When undertaking content analysis for the present research, there were two research objectives:

1) What are the key elements in rubrics design of research-based courses in higher education (HE) at QF level 5 for sustainable development?

Based on the qualitative analysis on text search, the key elements in rubrics design of research-based courses in higher education (HE) at QF level 5 for sustainable development are: 'Rubrics on AI Tools for Skills Development', 'Ethical Thinking Development on AI' (1,343 references), 'Assessment on AI

Argumentative Thinking' (651 references), 'Evaluation on AI Creativity in Tasks' (550 references), "Critical Thinking on AI in Social Inclusion' (491 references) and "Declaration on AI Tools' (267 references)

Table 1. Text Search on the Key Elements in Ai Rubrics Design

'Rubrics on AI Tools for SKills Development	9	1343
'Ethical Thinking Development on AI	9	957
'Assessment on AI Argumentative Thinking	9	651
'Evaluation on AI Creativity in Tasks	9	550
'Identification on AI Task Performance	9	536
'Critical Thinking on AI in Social Inclusion	9	491
'Declaration on AI Tools	9	267

For the QF Level 5, Generic Level Descriptors (GLD) is expected to udpate with AI application elements to assess students' competencies. Please refer to diagram 1.

In order to encourage students to have self learning skills on adoption of AI in research-based assignment, it is time to explore a new set of generic learning descriptors with the elements of 1) demonstrate AI assistance in data collection, interpretation and predictions of findings; 2) design AI-assistant rubrics of self assessment; 3) implement AI assistance learning outcomes into assignment guidelines with explanation to students for separate AI-assistance learning elements and their own contribution via an AI assessement form; 4) critically re-assess the AI rubrics to ensure their fariness and accuracy in assessing students;' competency; and 5) explore the effectiveness of AI-generated rubrics for students' self learning and self-improvement.

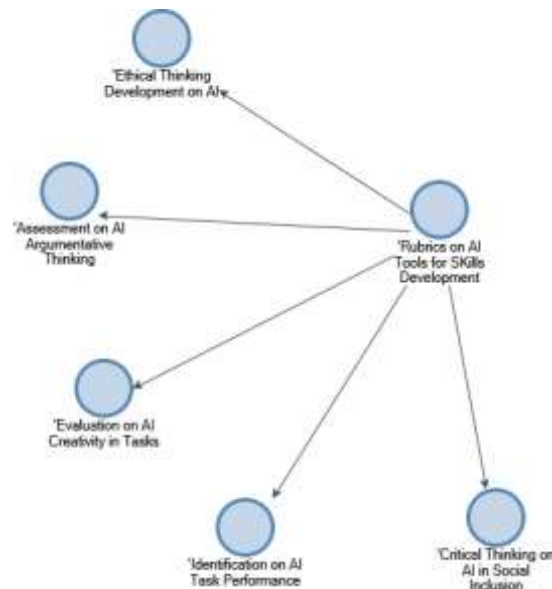**Diagram 1 – Model on Rubrics on AI for Skills Development**

Table 2 - Text Search on Selected Documents via Nvivo Analysis

Name	Sources	References
'Rubrics on AI Tools for SKills Development	9	1343
'Ethical Thinking Development on AI	9	957

'Assessment on AI Argumentative Thinking	9	651
'Evaluation on AI Creativity in Tasks	9	550
'Identification on AI Task Performance	9	536
'Critical Thinking on AI in Social Inclusion	9	491
'Declaration on AI Tools	9	267

Table 3 – Text Search on 'Rubrics on AI Tools for SKills Development"

Name	References	Coverage
academic-regulations-e	9	0.01%
Ai Rubrics Guidelines for Using GAI Tools (Oct 2024)	29	1.05%
ApL Prospectus_2024_26 Cohort_Final	413	0.56%
DM_s2022_028	15	0.07%
HKCAAVQ_AR22-23	95	0.21%
Teacher Handbook 231006	128	0.38%
The-revised-GLD-and-the-Explanatory-Notes_Eng_April_2018	118	0.76%
Tuning-CALOHEX-Business-Brochure-Final-light	310	0.62%
VQP{_AI_full_version-1717041928	226	0.55%

Table 4 – Text Search on 'Ethical Thinking Development on AI'

Name	References	Coverage
academic-regulations-e	11	0.01%
Ai Rubrics Guidelines for Using GAI Tools (Oct 2024)	9	0.38%
ApL Prospectus_2024_26 Cohort_Final	271	0.41%
DM_s2022_028	9	0.05%
HKCAAVQ_AR22-23	90	0.20%
Teacher Handbook 231006	124	0.37%
The-revised-GLD-and-the-Explanatory-Notes_Eng_April_2018	25	0.21%
Tuning-CALOHEX-Business-Brochure-Final-light	252	0.57%
VQP{_AI_full_version-1717041928	166	0.44%

Table 5 – Text Search on 'Assessment on AI Argumentative Thinking'

Name	References	Coverage
academic-regulations-e	121	0.13%
Ai Rubrics Guidelines for Using GAI Tools (Oct 2024)	21	1.51%
ApL Prospectus_2024_26 Cohort_Final	60	0.06%

DM_s2022_028	11	0.07%
HKCAAVQ_AR22-23	97	0.20%
Teacher Handbook 231006	103	0.33%
The-revised-GLD-and-the-Explanatory-Notes_Eng_April_2018	8	0.08%
Tuning-CALOHEX-Business-Brochure-Final-light	138	0.30%
VQP{_AI_full_version-1717041928	92	0.22%

2) What are the key elements to be added onto research-based courses at QF level 5 to meet the needs of the future?

Hanna et al., (2024) indicated that AI ethics can be defined as "a set of values, principles, and techniques that employ widely accepted standards of right and wrong to guide moral conduct in the development and use of AI technologies." AI ethics are necessary in a research-based course in data collection and interpretation of data to avoid negative unintended consequences of AI applications in the research process. Furthermore, AI ethics in the rubrics are, in fact, a set of values on top of the four domains of GLD to guide students to develop moral thinking in the process of applying AI in knowledge acquisition. Please refer to table 6 for the recommended GLD.

Table 6 Recommended Generic Level Descriptors (GLD)- Level 5 with

Considerations of AI and Social Inclusion

Knowledge & Intellectual Skills (**Social Inclusion Elements**)	Processes	Application, Autonomy & Accountability; and	Communication, IT and Numeracy (**AI-assistant Elements**)
- Generate ideas through the analysis of abstract information and concepts and **explore AI role in the process of generating ideas with social inclusion elements** - Command wide ranging, specialised technical, creative and/or conceptual skills - Identify and analyse both routine and abstract professional problems and issues, and formulate evidence-based responses with **clearly identified responses generated by human and/ or AI so as to**	- Utilise diagnostic and creative skills in a range of technical **with involvement of AI devices,** professional or management functions - Exercise appropriate judgment in planning, design, technical and/or supervisory functions related to products, services, operations or processes with **identification of emotional and behavioural support in the learning process**	- Perform tasks involving planning, design, and technical skills, and involving some management functions - Accept responsibility and accountability within broad parameters for determining and achieving personal and/or group outcomes - **Develop ability of AI accessiblity for peers who are having learning difficulties for social inclusion** - Work under the mentoring of senior qualified practitioners - Deal with ethical issues, **for example plagarism on AI for**	- Use a range of routine skills and some advanced and specialized skills in support of established practices in a subject/discipline, for example: - Make formal and informal presentations on standard/mainstream topics in the subject/discipline to a range of audiences - Participate in group discussions about complex subjects; create opportunities for others to contribute - Use a range of **IT and AI tools, if applied in predictive analysis** in applications to support and enhance work

develop a critical mindset - Analyse, reformat and evaluate a wide range of information - Critically analyse, evaluate and/or synthesise ideas, concepts, information and issues - Draw on a range of sources in making judgements.		**content similarity and adoption of accepted AI contents into assignments,** seeking guidance of others where appropriate.	- Interpret, use and evaluate numerical and graphical data to achieve goals/targets.

Source from: https://www.prepai.io/blog/ai-in-inclusive-learning/

Conclusion, Managerial Implications and Discussion

The findings of content analysis on selected documents related to research-based courses at QF level 5 with consideration of social inclusion for CSR and sustainable devlopment can help learners to achieve UNSDGs 4.7 knowledge transfer and 9 innovation, for example: 'Rubrics on AI Tools for Skills Development', 'Ethical Thinking Development on AI' (1,343 references), 'Assessment on AI Argumentative Thinking' (651 references), 'Evaluation on AI Creativity in Tasks' (550 references), 'Critical Thinking on AI in Social Inclusion' (491 references) and 'Declaration on AI Tools' (267 references). Besides, learners can develop self assessment skills via understading the use of AI rubrics in data collection, interpretation and predictions of findings; design AI-assistant rubrics of self assessment; and critically re-assess the AI rubrics to ensure AI rubrics can fairly reflect the competencies. Based on the nvivo analysis, the recommended GLD framework (table 6) and diagram 1 - Model on Rubrics on AI for Skills Development may be of value to curriculum designers, teachers and students for self assessment in higher education – learning how to establish, apply and finetune AI rubrics for research-based course. It is recommended to implement the diagram with AI governance, process, and measurement for realizing the practicality of the model to benefit learners and the HE community as a whole.

For the methodological limitations of the study are the use of qualitative data relating to the documents selected for analysis from the perception of the author. Studies using quantitative data might help further our understanding of other relevant AI rubrics for sustainable education development. This paper mainly studied the papers published in relation to AI rubrics and assessments in curriculum design. Good practices on Ai rubrics and social inclusin in technology used in self learning open up a new research area in the education sector.

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Appendix I   Sustainability Mindset Model, Kerul et al. (2016)